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## REMARKS

Herein, the "Action" or "Office Action" refers to the Office Action dated October 2, 2001.

Applicant respectfully requests reconsideration and allowance of all of the claims of the application. Claims 1-42 are presently pending. Claims 1-3, 22, 26, 33, and 34 are amended. Claims 36-42 are new.

The Applicant expressly grants permission to the Office to interpret all pending claims of this application.

### Interview with Examiner

On Monday, December 03, 2001, the Office talked with applicant's attorney, Kasey C. Christie, via a telephonic interview. Applicant appreciates the Office's willingness to provide such an interview.

The primary focus of the interview was distinguishing the cited references from one or more claims. Applicant (via its attorney) highlighted the existence of some claimed elements and features that were not found in cited reference. For example, no cited reference suggests, teaches, or discloses selective insertion of strong or weak watermarks in the manner as recited by Applicant's claims (e.g., claims 2 and 3).

At the conclusion of the interview, the Office requested that the Applicant submit a written response in accordance with the content of the interview. This document is that written response.

1 **Traversal of Official Notices**

2 Claims 5, 9, 10, 11, 20, 24, 15, 19, and 32 are rejected, at least in part, by  
3 the Office taking Official Notice. Other claims (such as claims 6 and 7) are  
4 rejected, at least in part, based upon reasoning the Office uses for the above  
5 claims—which rely on the taking of Official Notice.

6 Applicant traverses the Official Notices for each rejected claim. Applicant  
7 disagrees with the Office's contentions. Applicant requests that the Office provide  
8 one or more affidavits setting forth the details of each contention of these rejected  
9 claims. The Office is required to provide such an affidavit, when requested, under  
10 37 C.F.R. §1.107(b).

11 **Prior Art Status of References**

12  
13 Applicant does not explicitly or implicitly admit that any reference is prior  
14 art. Nothing in this communication should be considered an acknowledgement,  
15 acceptance, or admission that any reference is considered prior art.

16  
17 **Drawing Objection**

18 **Drawings**

19 The Office objects to Figure 1 of the drawings under MPEP §608.02(g).  
20 More specifically, the Office states:  
21

22 Figure 1 should be designated by a legend such as—Prior  
23 Art—because only that which is old is illustrated....Although the  
24 figure shows an apparatus that could be used in applicant's  
25 invention, the figure does not contain elements that applicant  
considers exclusive to the instant invention.

1  
2 Upon notice of allowance, Applicant will submit a new Figure 1 that  
3 contains a legend, such as "Background," in accordance with the Office's request.  
4 Applicant will also submit a separate letter to the Draftsperson and highlighted  
5 drawing pages. This letter will request that new formal drawings be added to the  
6 file if the changes are acceptable.

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## 8 Substantive Claim Rejections

### 9 Claim Rejections under §102 and §103

10 The Office rejects all pending claims under §102 and §103. For the reasons  
11 set forth below, the Office has not made out a *prima facie* case of anticipation (i.e.,  
12 §102). Likewise, for the reasons set forth below, the Office has not made out a  
13 *prima facie* case of obviousness (i.e., §103). Accordingly, Applicant respectfully  
14 requests that the rejections be withdrawn and the case be passed along to issuance.

15 The Office's rejections are based upon one or more of the following  
16 references (in combination or alone):

- 17 • **Mintzer:** *Mintzer et al.*, "If One Watermark is Good, Are More  
18 Better?", Acoustic, Speech, and Signal Processing, vol. 4, pp. 2067-  
19 2069, 1999;
  - 20 • **Linnartz:** *Linnartz*, US Patent No. 5,933,798;
  - 21 • **Levine:** *Levine et al.*, US Patent No. 6,209,094;
  - 22 • **Adler:** *Adler et al.*, U.S. Patent No. 6,275,599.
- 23  
24  
25

1 Mintzer

2 Focusing on Mintzer is appropriate here because it is a reference used by  
3 the Office as a basis of its rejections of the majority of the pending claims under  
4 §102 and §103. Much of this discussion was part of the above-referenced  
5 telephonic interview with the Office on December 3, 2001.

6 Mintzer indicates (in particular in section 2, p. 2068) that embedding  
7 multiple disparate watermarks is a delicate process. In particular, this Mintzer  
8 quote states a fundamental problem that one encounters when embedding multiple  
9 disparate watermarks: "Embedding a fragile watermark followed by a robust  
10 watermark is bound to damage the fragile watermark."

11 Mintzer's proposed solution to this problem is to layer the multiple  
12 disparate watermarks within the same portions of the digital object and do so in  
13 order from most robust to least robust watermark. In other words, a given portion  
14 of a digital object includes multiple watermarks. They are embedded in such a  
15 way that so that the ones least likely to be damaged by subsequent watermark  
16 embedding are embedded first.

17 With one or more of the Applicant's claims, Applicant solves the same  
18 problem revealed by Mintzer in a manner that is different than that suggested by  
19 Mintzer. For example, claim 3 recites an insertion of "...the strong watermark  
20 when the signal exceeds the hearing threshold and insert the weak watermark  
21 when the signal falls below the hearing threshold."

1 As recited in claim 3 (and other similar claims), the watermarks are NOT  
2 layered as suggested by Mintzer. As recited in claim 3 (and other similar claims),  
3 the embedding of a weak watermark after a strong watermark is NOT "bound to  
4 damage the fragile watermark" as suggested by Mintzer. That is because the  
5 watermarks are not layered within the same portions of the digital object as is  
6 suggested by Mintzer.

7 Accordingly, Applicant submits that the Office withdraw its substantive  
8 rejections (under §102 or §103) of claims where Mintzer is the sole or primary  
9 reference and claim coverage includes that related to non-layered, multiple  
10 disparate watermarks. More specifically, the Office should withdraw its rejection  
11 of all claims.

## 12 Anticipation Rejections

### 13 The §102 (Anticipation) Standard

14 In making out a §102 rejection, the Federal Circuit has stated that a  
15 reference anticipates a claim if it discloses every element of the claim. *See*  
16 Scripps Clinic & Res. Found. v. Genentech, Inc., 927 F.2d 1565, 1576 (Fed. Cir.  
17 1991); Richard v. Suzuki Motor Co., 868 F.2d 1226, 1236 (Fed. Cir. 1989). Thus,  
18 anticipation is determined by "identify[ing] the elements of the claims,  
19 determin[ing] their meaning in light of the specification and prosecution history,  
20 and identify[ing] corresponding elements disclosed in the allegedly anticipating  
21 reference." Lindermann Maschinenfabrik GMBH v. American Hoist & Derrick  
22 Co., 730 F.2d 1452, 1458 (Fed. Cir. 1984).

1       Consequently, if any claimed element is missing from the allegedly  
2 anticipating reference, then anticipation is negated. Kloster Speedsteel AB v.  
3 Crucible Inc., 793 F.3d 1565, 1571 (Fed. Cir. 1987). Close is not enough. Every  
4 element in the claim must exist in the allegedly anticipating reference for the §102  
5 rejection to stand.

6       **Claims 1, 4, 22, 26, 33, and 34**

7  
8       The Office rejects claims 1, 4, 22, 26, 33, and 34 under 35 USC §102(a) as  
9 being clearly anticipated by Mintzer.

10       Claim 1

11  
12       Mintzer does not disclose every element of amended claim 1. For example,  
13 the claim recites a watermark insertion unit to “...*selectively choose* insertion of  
14 the strong watermark *or* the weak watermark into segments of the audio signal ...”  
(emphasis added).

15       As discussed above, Mintzer does not disclose this. In fact, Mintzer  
16 discloses, teaches, suggests, and motivates one to overcome the problems of  
17 inserting multiple disparate watermarks by layering the insertion of the  
18 watermarks.

19       For the above reasons, Mintzer does disclose every element of claim 1.  
20 Accordingly, Mintzer does not anticipate claim 1. Applicant asks that the Office  
21 withdraw this rejection.  
22  
23  
24  
25

1        Claims 4, 22, 26, 33, and 34

2        Although these claims are different from claim 1, Applicant submits that  
3        these claims are allowable for, at least, some of the same reasons given above in  
4        the discussion of claim 1.

5        For the above reasons, Mintzer does disclose every element of these claims.  
6        Accordingly, Mintzer does not anticipate these claims. Applicant asks that the  
7        Office withdraw this rejection.

8        Claims 12-14 and 16

9  
10       The Office rejects these claims under 35 USC §102(e) as being clearly  
11       anticipated by Linnartz. Applicant expressly reserves the right to file a §131  
12       declaration with respect to Linnartz.

13       Claim 12

14       Linnartz does not disclose every element of claim 12. For example, the  
15       claim recites a correlation module to “...*detect whether* a strong watermark and a  
16       weak watermark is present *in the portion* of the watermarked audio signal...”  
17       (emphasis added).

18       Linnartz simply does not disclose the presence of multiple watermarks  
19       within a watermarked signal. Linnartz discloses detection of a single watermark  
20       within a signal. According to the legal standard for anticipation under §102 (as  
21       discussed above), Linnartz cannot anticipate claim 12 because it does not disclose  
22       every element of the claim.

23       Furthermore, the claim recites a “...*synchronization module to determine*  
24       *which portion* of a watermarked audio signal might contain a watermark...”  
25       (emphasis added). Linnartz does not disclose a synchronization module.

1 Furthermore, it does not teach such a module that determines which portion of the  
2 signal might contain a watermark.

3 The Office states, “the input [presumably to evaluation circuit 24 of Fig. 2  
4 of Linnartz] reads on applicant’s synchronization circuit, as in all of the data might  
5 contain a watermark.” Applicant does not understand the Office’s reasoning.

6 This “input” is not a module. It is not a “synchronization module.” The  
7 input is also not performing any action were it may “determine which portion” of a  
8 signal “might contain a watermark.” An “input” cannot make a determination.

9 For the above reasons, Linnartz does disclose every element of claim 12.  
10 Accordingly, Linnartz does not anticipate claim 12. Applicant asks that the Office  
11 withdraw this rejection.

12 Claims 13, 14 and 16

13 Although these claims are different from claim 12, Applicant submits that  
14 these claims are allowable for, at least, some same reasons given above in the  
15 discussion of claim 12.

16 For the above reasons, Linnartz does disclose every element of these  
17 claims. Accordingly, Linnartz does not anticipate these claims. Applicant asks that  
18 the Office withdraw this rejection.



## Obviousness Rejections

### The §103 (Obviousness) Standard

In making out a §103 rejection, the Federal Circuit has stated that when one or more reference or source of prior art is required in establishing obviousness, “it is necessary to ascertain whether the prior art *teachings* would appear to be sufficient to one of ordinary skill in the art to suggest making the claimed substitutions or other modification.” *In re Fine*, 5 USPQ 2d, 1596, 1598 (Fed. Cir. 1988). That is, to make out a prima facie case of obviousness, the references must be examined to ascertain whether the combined *teachings* render the claimed subject matter obvious. *In re Wood*, 202 USPQ 171, 174 (C.C.P.A. 1979).

Moreover, there is a requirement that there must be some reason, suggestion, or motivation *from the prior art*, as a whole, for the person of ordinary skill to have combined or modified the references. *See, In re Geiger*, 2 USPQ 2d 1276, 1278 (Fed. Cir. 1987). It is impermissible to use the claimed invention as an instruction manual or “template” to piece together the teachings of the prior art so that the claimed invention is rendered obvious. One cannot use hindsight reconstruction to pick and choose among isolated disclosures in the prior art to deprecate the claimed invention. *In re Fritch*, 23 USPQ 2d 1780, 1784 (Fed. Cir. 1992).

A factor cutting against a finding of motivation to combine or modify the prior art is when the prior art *teaches away* from the claimed combination. A reference is said to teach away when a person of ordinary skill, upon reading the

1 reference, would be led in a direction divergent from the path that the applicant  
2 took. *In re Gurley*, 31 USPQ 2d 1130, 1131 (Fed. Cir 1994).

3 In addition, the references must either be in the field of the inventor's  
4 endeavor, or reasonably pertinent to the specific problem with which the inventor  
5 was involved. *In re Deminski*, 230 USPQ 313, 315 (Fed. Cir. 1986). Put another  
6 way, the references must be in an art *analogous* to that of the invention.

7 In order for a prima facie case of obviousness to be made, the resulting  
8 combination or motivation must appear to show or suggest the claimed invention.  
9 *In re Nielson*, 2 USPQ 2d 1525, 1528 (Fed. Cir. 1987).

### 10 11 **The Office Has Not Made Out a Case of Prima Facie Obviousness**

12 Applicant disagrees with the Office's obviousness rejections and  
13 respectfully submits that the Office has not made out a *prima facie* case of  
14 obviousness. Accordingly, Applicant respectfully requests withdrawal of these  
15 rejections.

### 16 **Claim 2**

17 The Office rejects this claim under 35 USC §103(a) as being unpatentable  
18 over Mintzer in view of Levine.

19 The Office relies on Mintzer for the primary basis for this rejection. As  
20 explained above (in section titled "Mintzer" and in the discussion of claim 1),  
21 Mintzer discloses, teaches, suggests, and motivates one to overcome the problems  
22 of inserting multiple disparate watermarks by layering the insertion of the  
23 watermarks. The watermark insertion unit of this claim does not use the  
24 watermark layering suggested by Mintzer.  
25

1 Furthermore, Levine is not concerned with multiple disparate watermarks.  
2 Rather, it is focused on increasing the robustness of a watermark in an audio signal  
3 and thereby making it more difficult to attack. Therefore, Levine's discussion (in  
4 lines 45-51 of col. 5) about audible range of the human listener is emphasizing the  
5 benefits of embedding watermarks in the audible range to enhance their  
6 robustness.

7 There is no motivation to combine their teachings. Furthermore, the  
8 combination of these teachings does not result in what is claimed by this claim.  
9 Accordingly, this claim is not obvious for the above reasons. Applicant asks that  
10 the Office withdraw this rejection.

11 **Claims 3, 27-29, and 35**

12 The Office rejects these claims under 35 USC §103(a) as being  
13 unpatentable over Mintzer in view of Levine and Adler.

14 As discussed above (with respect to claim 2), there is no motivation to  
15 combine teachings of Mintzer and Levine.

16 Furthermore, Adler is not applicable. The reasons why were discussed  
17 during the telephonic interview. In short, the production of "mostly invisible  
18 artifacts" in the realm of digital images is not analogous to the production of a  
19 weak watermark in an inaudible portion of an audio signal. "Mostly invisible"  
20 means visible but difficult for a human to perceive. A truly invisible artifact  
21 cannot be mechanically reproduced. "Inaudible" portions of audio cannot be heard  
22 by humans. However, they can be mechanically reproduced. Therefore, Adler is  
23 not applicable.  
24  
25

1           Consequently, there is no motivation to combine Adler with either Mintzer  
2 or Levine. There is no motivation to combine the teachings of any of these  
3 references. Furthermore, the combination of these teachings does not result in  
4 what is claimed by these claims. Accordingly, these claims are not obvious for the  
5 above reasons. Applicant asks that the Office withdraw this rejection.

6           **Claims 5, 10, 11, and 24**

7  
8           The Office rejects these claims under 35 USC §103(a) as being  
9 unpatentable over Mintzer in view of Levine as applied to the Office's reasoning  
10 for rejecting claim 2.

11           As discussed above (with respect to claim 2), there is no motivation to  
12 combine teachings of Mintzer and Levine.

13           Although the Office acknowledges that neither reference discloses a  
14 determination "of the absolute magnitude of a sound and using that to determine if  
15 the data is audible," the Office takes Official Notice of such. As indicated above  
16 (in the titled "Traversal of Official Notices"), Applicant traverses this Official  
17 Notice. Applicant requests that the Office provide one or more affidavits setting  
18 forth the details of the Office's contention. Applicant asks for the Office to  
19 provide motivation for combining the details of that affidavit with the teachings of  
20 Mintzer and Levine.

21           There is no motivation to combine the teachings of any of these references  
22 and the Official Notice. Furthermore, the combination of these teachings does not  
23 result in what is claimed by these claims. Accordingly, these claims are not  
24 obvious for the above reasons. Applicant asks that the Office withdraw this  
25 rejection.

1 **Claims 6, 7, [and 8]**

2 The Office rejects these claims under 35 USC §103(a) as being  
3 unpatentable over Mintzer in view of Levine as applied to the Office's reasoning  
4 for rejecting claim 5, and further in view of Adler. Applicant believes that Office  
5 intended to include the rejection of claim 8 here because claim 8 is mentioned in  
6 the Action.

7 As discussed above (with respect to claim 5), there is no motivation to  
8 combine teachings of Mintzer, Levine, and/or Adler. Also, as discussed above,  
9 Adler is not applicable.

10 There is no motivation to combine the teachings of any of these references.  
11 Furthermore, the combination of these teachings does not result in what is claimed  
12 by these claims. Accordingly, these claims are not obvious for the above reasons.  
13 Applicant asks that the Office withdraw this rejection.

14 **Claim 9**

15 The Office rejects this claim under 35 USC §103(a) as being unpatentable  
16 over Mintzer in view of Levine as applied to the Office's reasoning for rejecting  
17 claim 5.

18 As discussed above (with respect to claim 5), there is no motivation to  
19 combine teachings of Mintzer and Levine.

20 Although the Office acknowledges that neither reference discloses "a  
21 compression unit, wherein the compression unit and the audio watermark  
22 encoding system both utilize the magnitude components," the Office takes Official  
23 Notice of such. As indicated above (in the titled "Traversal of Official Notices"),  
24  
25

1 Applicant traverses this Official Notice. Applicant requests that the Office provide  
2 one or more affidavits setting forth the details of the Office's contention.  
3 Applicant asks for the Office to provide motivation for combining the details of  
4 that affidavit with the teachings of Mintzer and Levine.

5 There is no motivation to combine the teachings of any of these references  
6 and the Official Notice. Furthermore, the combination of these teachings does not  
7 result in what is claimed by this claim. Accordingly, these claims are not obvious  
8 for the above reasons. Applicant asks that the Office withdraw this rejection.

9 **Claims 17, 18, 21, and 25**

10  
11 The Office rejects these claims under 35 USC §103(a) as being  
12 unpatentable over Linnartz in view of Mintzer and Levine.

13 As discussed above, there is no motivation to combine teachings of Mintzer  
14 and Levine. In addition, these claims recite a "converter to convert a watermarked  
15 audio signal into magnitude and phase components" and a "mask processor to  
16 determine a hearing threshold for corresponding magnitude components." The  
17 Office has cited no reference that contains the converter and mask processor of  
18 these claims.

19 Linnartz is focused on single watermarks while Mintzer provides no  
20 implementation details on how to embed or detect multiple watermarks. However,  
21 the Office has given no reasoning to believe that element 21 of Linnartz (which  
22 the Office says anticipates a pattern generator) and that element 24 (which the  
23 Office says anticipates a detector) are capable of accommodating multiple  
24 disparate watermarks.  
25

1 There is no motivation to combine the teachings of any of these references.  
2 Furthermore, the combination of these teachings does not result in what is claimed  
3 by these claims. Accordingly, these claims are not obvious for the above reasons.  
4 Applicant asks that the Office withdraw this rejection.

5 **Claim 20**

6 The Office rejects this claim under 35 USC §103(a) as being unpatentable  
7 over Linnartz, Mintzer, and Levine as applied to the Office's reasoning for  
8 rejecting claim 17.

9 As discussed above (with respect to claim 17), there is no motivation to  
10 combine teachings of Mintzer and Levine. Furthermore, these references do not  
11 disclose, teach, or suggest all of the elements claimed by claim 20.

12 Although the Office acknowledges that neither reference discloses "a  
13 decompressor," the Office takes Official Notice of such. As indicated above (in  
14 the titled "Traversal of Official Notices"), Applicant traverses this Official Notice.  
15 Applicant requests that the Office provide one or more affidavits setting forth the  
16 details of the Office's contention. Applicant asks for the Office to provide  
17 motivation for combining the details of that affidavit with the teachings of Mintzer  
18 and Levine.

19 There is no motivation to combine the teachings of any of these references  
20 and the Official Notice. Furthermore, the combination of these teachings does not  
21 result in what is claimed by this claim. Accordingly, these claims are not obvious  
22 for the above reasons. Applicant asks that the Office withdraw this rejection.  
23  
24  
25

1 **Claim 23**

2 The Office rejects this claim under 35 USC §103(a) as being unpatentable  
3 over Mintzer in view of Linnartz. In addition to other reasons, this claim is  
4 allowable because its base claim (claim 22) is allowable.

5 **Claims 30 and 31**

6  
7 The Office rejects these claims under 35 USC §103(a) as being  
8 unpatentable over Mintzer, Levine, and Adler as applied to the Office's reasoning  
9 for rejecting claim 29, and further in view of Linnartz.

10 As discussed above, there is no motivation to combine teachings of  
11 Mintzer, Levine, and/or Adler. Also, as discussed above, Adler is not applicable.  
12 In addition to other reasons, these claims are allowable because their base claim  
13 (claim 29) is allowable.

14 **Claims 15, 19, and 32**

15 The Office rejects these claims under 35 USC §103(a) as being  
16 unpatentable over Mintzer, Levine, and Adler as applied to the Office's reasoning  
17 for rejecting claims 12, 17, and 27.

18 Although the Office acknowledges that neither reference discloses that "the  
19 correlation value must be exceeded by a random number," the Office takes  
20 Official Notice of such. As indicated above (in the titled "Traversal of Official  
21 Notices"), Applicant traverses this Official Notice. Applicant requests that the  
22 Office provide one or more affidavits setting forth the details of the Office's  
23 contention. Applicant asks for the Office to provide motivation for combining the  
24 details of that affidavit with the teachings of Mintzer, Levine, and Adler.  
25



1 As discussed above, there is no motivation to combine teachings of  
2 Mintzer, Levine, and/or Adler. Also, as discussed above, Adler is not applicable.  
3 In addition to other reasons, these claims are allowable because their base claims  
4 are allowable.

### 5 **Dependent Claims**

6  
7 In addition to other possible reasons, each dependent claim is allowable for  
8 the same reasons that its base claim is allowable. Applicant submits that the  
9 Office withdraw the rejection of each dependent claim where its base claim is  
10 allowable.

### 11 **Claim Amendments**

12  
13 All of the claim amendments are done to make the claim language more  
14 readable, linguistically clearer, and/or grammatically correct. None of the  
15 amendments is done to meet any statutory requirement. None narrows the scope of  
16 the claims within the meaning of *Festo Corp. V. Shoketsu Kinzoku Kogyo*  
17 *Kabushiki Co.*, 56 USPQ2d 1865 (Fed. Cir. 2000).

18 For example, formerly dependent claims 2 and 3 have been converted into  
19 an independent form.  
20  
21  
22  
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25

1 Conclusion

2 All pending claims are in condition for allowance. Applicant respectfully  
3 requests reconsideration and prompt issuance of the application. If any issues  
4 remain that prevent issuance of this application, the Office is urged to contact the  
5 undersigned attorney before issuing a subsequent Action.  
6

7 Respectfully Submitted,

8  
9 Dated: 12-19-01

10 By: 

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1 **Amended Claims (and the non-amended pending claims)**

2 **(in Marked-up Form, in accordance with 37 CFR §1.121):**

3  
4  
5 Please amend claims 1-3, 22, 26, 33, and 34 and add claims 36-42 as indicated  
6 below:

7  
8 1. (AMENDED) An audio watermarking system comprising  
9 a pattern generator to generate both a strong watermark and a weak  
10 watermark; and  
11 a watermark insertion unit to [insert] selectively choose insertion of the  
12 strong watermark [and] or the weak watermark into segments of the audio signal.

13  
14 2. (AMENDED) An audio watermarking system [as recited in  
15 claim 1,] comprising:

16 a pattern generator to generate both a strong watermark and a weak  
17 watermark; and

18 a watermark insertion unit to insert the strong watermark and the weak  
19 watermark into the audio signal,

20 wherein the watermark insertion unit selectively inserts the strong  
21 watermark or the weak watermark into segments of the signal according to an  
22 audible measure of the segments.

1           **3. (AMENDED)**           An audio watermarking system [as recited in  
2 claim 1, further] comprising:

3           a pattern generator to generate both a strong watermark and a weak  
4 watermark;

5           a watermark insertion unit to insert the strong watermark and the weak  
6 watermark into the audio signal;

7           a processor to determine a hearing threshold for the audio signal; and  
8           the watermark insertion unit inserts the strong watermark when the signal  
9 exceeds the hearing threshold and insert the weak watermark when the signal falls  
10 below the hearing threshold.

11  
12           **4.**   An operating system comprising an audio watermarking system as  
13 recited in claim 1.

14  
15           **5.**   An audio watermark encoding system comprising:

16           a converter to convert an audio signal into magnitude and phase  
17 components;

18           a mask processor to determine a hearing threshold for corresponding  
19 magnitude components;

20           a pattern generator to generate both a strong watermark and a weak  
21 watermark; and

22           a watermark insertion unit to selectively insert one of the strong watermark  
23 or the weak watermark into the audio signal based on whether the magnitude  
24 components exceed or fall below the hearing threshold.

1           6.     An audio watermark encoding system as recited in claim 5, wherein  
2 the watermark insertion unit inserts the strong watermark when the magnitude  
3 component exceeds the hearing threshold and inserts the weak watermark when  
4 the magnitude component falls below the hearing threshold.

5  
6           7.     An audio watermark encoding system as recited in claim 5, wherein  
7 the watermark insertion unit inserts the strong watermark when the magnitude  
8 component exceeds the hearing threshold by a predetermined amount and inserts  
9 the weak watermark when the magnitude component falls below the hearing  
10 threshold by the predetermined amount.

11  
12           8.     An audio watermark encoding system as recited in claim 7, wherein  
13 the watermark insertion unit foregoes inserting the strong watermark or the weak  
14 watermark when the magnitude component lies within the predetermined amount  
15 above and below the hearing threshold.

16  
17           9.     An audio encoding system comprising:  
18           an audio watermark encoding system as recited in claim 5; and  
19           a compression unit, wherein the compression unit and the audio watermark  
20 encoding system both utilize the magnitude components.

21  
22           10.    An operating system comprising an audio watermark encoding  
23 system as recited in claim 5.  
24  
25

1           **11.**     A watermark insertion unit, comprising:

2           an input to receive frequency magnitude components of an audio signal,  
3           hearing thresholds derived from the magnitude components, strong watermark  
4           values, and weak watermark values; and

5           multiple insertion operators for selectively combining the magnitude  
6           components and one of the strong watermark values or the weak watermark values  
7           depending upon whether the magnitude components exceed or fall below the  
8           hearing thresholds.

9  
10          **12.**     An audio watermark detection system, comprising:

11          a synchronization module to determine which portion of a watermarked  
12          audio signal might contain a watermark; and

13          a correlation module to detect whether a strong watermark and a weak  
14          watermark is present in the portion of the watermarked audio signal.

15  
16          **13.**     An audio watermark detection system as recited in claim 12, wherein  
17          the correlation module computes a correlation value from the watermarked audio  
18          signal and the strong watermark that tends toward a first value when the strong  
19          watermark is present and a second value when the strong watermark is not present.

1           **14.**   An audio watermark detection system as recited in claim 12,  
2 wherein the correlation module computes a correlation value from the  
3 watermarked audio signal and the weak watermark that tends toward a first value  
4 when the weak watermark is present and a second value when the weak watermark  
5 is not present.

6  
7           **15.**   An audio watermark detection system as recited in claim 12,  
8 wherein the correlation module computes a correlation value from the  
9 watermarked audio signal and one of the strong watermark or the weak  
10 watermark, the correlation module determining that said one strong watermark or  
11 weak watermark is present when the correlation value exceeds a predetermined  
12 threshold plus a random amount.

13  
14           **16.**   An operating system comprising an audio watermark detection  
15 system as recited in claim 12.

16  
17           **17.**   An audio watermark detection system comprising:  
18           a converter to convert a watermarked audio signal into magnitude and  
19 phase components;  
20           a mask processor to determine a hearing threshold for corresponding  
21 magnitude components;  
22           a pattern generator to generate both a strong watermark and a weak  
23 watermark; and  
24           a watermark detector to detect presence of the strong watermark and the  
25 weak watermark in the audio signal.

1  
2       **18.**    An audio watermark detection system as recited in claim 17,  
3 wherein the watermark detector computes correlation values from the  
4 watermarked audio signal and each of the strong watermark and the weak  
5 watermark and detects the presence of the strong watermark and the weak  
6 watermark based on whether the correlation values exceed a predetermined  
7 threshold.

8  
9       **19.**    An audio watermark detection system as recited in claim 17, further  
10 comprising:

11       a random operator for generating a random value; and  
12       the watermark detector computes correlation values from the watermarked  
13 audio signal and each of the strong watermark and the weak watermark and  
14 detects the presence of the strong watermark and the weak watermark based on  
15 whether the correlation values exceed a predetermined threshold plus the random  
16 value.

17  
18       **20.**    An audio decoding system comprising:  
19       an audio watermark detection system as recited in claim 17; and  
20       a decompression unit, wherein the decompression unit and the audio  
21 watermark detection system both utilize the magnitude components.

22  
23       **21.**    An operating system comprising an audio watermark detection  
24 system as recited in claim 17.  
25



1           **22. (AMENDED)**     An audio watermarking architecture,  
2 comprising:

3           a watermark encoding system to [insert] selectively choose insertion of a  
4 strong watermark [and] or a weak watermark into segments of an audio signal; and  
5           a watermark detecting system to detect a presence of the strong watermark  
6 [and] or the weak watermark in the segments of the audio signal.

7  
8           **23.**     An audio watermarking architecture as recited in claim 22, wherein  
9 the watermark encoding system resides at a content producer to watermark  
10 original audio content and the watermark detecting system resides at one or more  
11 clients to detect the watermarks and play the original audio content.

12  
13           **24.**     An audio watermarking architecture as recited in claim 22, wherein  
14 the watermark encoding system comprises:

15           a converter to convert the audio signal into magnitude and phase  
16 components;

17           a mask processor to determine a hearing threshold for corresponding  
18 magnitude components;

19           a pattern generator to generate both the strong watermark and the weak  
20 watermark; and

21           a watermark insertion unit to selectively insert one of the strong watermark  
22 or the weak watermark into the audio signal based on whether the magnitude  
23 components exceed or fall below the hearing threshold.

1           25.     An audio watermarking architecture as recited in claim 22, wherein  
2 the watermark detecting system comprises:

3                 a converter to convert a watermarked audio signal into magnitude and  
4 phase components;

5                 a mask processor to determine a hearing threshold for corresponding  
6 magnitude components;

7                 a pattern generator to generate both a strong watermark and a weak  
8 watermark; and

9                 a watermark detector to detect presence of the strong watermark and the  
10 weak watermark in the audio signal.

11  
12           26.     **(AMENDED)**     A method for watermarking an audio signal,  
13 comprising:

14                 watermarking a first portion of the audio signal with a strong watermark;  
15 and

16                 watermarking a second portion of the audio signal with a weak watermark,  
17 wherein the first and second portions are distinguishable.

18  
19           27.     A method for watermarking an audio signal, comprising:

20                 comparing samples of the audio signal to a hearing threshold;

21                 watermarking samples exceeding the hearing threshold with a strong  
22 watermark; and

23                 watermarking samples falling below the hearing threshold with a weak  
24 watermark.

1           **28.**    A method as recited in claim 27, wherein the watermarking samples  
2 comprises:

3           watermarking samples exceeding the hearing threshold plus a buffer value  
4 with a strong watermark;

5           watermarking samples falling below the hearing threshold by less than the  
6 buffer value a with a weak watermark; and

7           leaving samples lying within the buffer value above and below the hearing  
8 threshold without a watermark.

9  
10          **29.**    A method as recited in claim 27, further comprising detecting the  
11 strong watermark and the weak watermark in the audio signal.

12  
13          **30.**    A method as recited in claim 29, wherein the detecting comprises  
14 computing a correlation value from the audio signal and the strong watermark, the  
15 correlation value tending toward a first value when the strong watermark is present  
16 and a second value when the strong watermark is not present.

17  
18          **31.**    A method as recited in claim 29, wherein the detecting comprises  
19 computing a correlation value from the audio signal and the weak watermark, the  
20 correlation value tending toward a first value when the weak watermark is present  
21 and a second value when the weak watermark is not present.

22  
23          **32.**    A method as recited in claim 27, further comprising:  
24           computing a correlation value from the audio signal and one of the strong  
25 watermark or the weak watermark; and

1 determining that said one strong watermark or weak watermark is present  
2 when the correlation value exceeds a predetermined threshold plus a random  
3 amount.

4  
5 **33. (AMENDED)** A method comprising:  
6 selectively encoding portions of an audio signal with [both] a strong  
7 watermark [and] or a weak watermark; and  
8 detecting a presence of the strong watermark and the weak watermark in  
9 the audio signal.

10  
11 **34. (AMENDED)** A computer readable medium having computer  
12 executable instructions for:  
13 watermarking a first portion of an audio signal with a strong watermark;  
14 and  
15 watermarking a second portion of the audio signal with a weak watermark,  
16 wherein the first and second portions are distinguishable.

17  
18 **35.** A computer readable medium having computer executable  
19 instructions for:  
20 comparing samples of an audio signal to a hearing threshold;  
21 watermarking samples exceeding the hearing threshold with a strong  
22 watermark; and  
23 watermarking samples falling below the hearing threshold with a weak  
24 watermark.

**NEW Claims**

1  
2  
3       **36.**     An audio watermarking system comprising:  
4             a pattern generator to generate both a strong watermark and a weak  
5 watermark; and  
6             a watermark insertion unit to insert the strong watermark and the weak  
7 watermark into the audio signal,  
8             wherein the watermark insertion unit selectively choose insertion of the  
9 strong watermark or the weak watermark into segments of the signal according to  
10 an audible measure of the segments.

11  
12       **37.**     An audio watermarking system comprising  
13             a pattern generator to generate both a strong watermark and a weak  
14 watermark; and  
15             a watermark insertion unit to insert of the strong watermark into one or  
16 more first segments of the audio signal and to insert of the weak watermark into  
17 one or more second segments of the audio signal, wherein the first and second  
18 segments are distinguishable.

19  
20       **38.**     An audio watermarking system as recited in claim 37, wherein the  
21 watermark insertion unit selectively chooses segments for insertion of the  
22 watermarks according to an audible measure of the segments.  
23  
24  
25

1           39.    An audio watermarking system as recited in claim 37, wherein the  
2 watermark insertion unit selectively chooses segments for insertion of the strong  
3 watermark according to an audible measure of the segments.

4  
5           40.    An audio watermarking system as recited in claim 37, wherein the  
6 watermark insertion unit selectively chooses segments for insertion of the weak  
7 watermark according to an audible measure of the segments.

8  
9           41.    An audio watermarking system as recited in claim 37, further  
10 comprising:

11           a processor to determine a hearing threshold for segments of the audio  
12 signal; and

13           the watermark insertion unit inserts the strong watermark into a segment  
14 when the signal of that segment exceeds the hearing threshold and insert the weak  
15 watermark into a segment when the signal of that segment falls below the hearing  
16 threshold.

17  
18           42.    An operating system comprising an audio watermarking system as  
19 recited in claim 37.